Text Mining assignment 2

1) Extract reviews of any product from ecommerce website like amazon 2) Perform emotion mining

In [1]:
```
!pip install spacy
```

```
Requirement already satisfied: spacy in c:\users\admin\anaconda3\lib\site-packages (2.3.5)
Requirement already satisfied: blis<0.8.0,>=0.4.0 in c:\users\admin\anaconda3\lib\site-packages (from spac
y) (0.7.4)
Requirement already satisfied: cymem<2.1.0,>=2.0.2 in c:\users\admin\anaconda3\lib\site-packages (from spac
y) (2.0.5)
Requirement already satisfied: srsly<1.1.0,>=1.0.2 in c:\users\admin\anaconda3\lib\site-packages (from spac
y) (1.0.5)
Requirement already satisfied: numpy>=1.15.0 in c:\users\admin\anaconda3\lib\site-packages (from spacy) (1.
19.2)
Requirement already satisfied: plac<1.2.0,>=0.9.6 in c:\users\admin\anaconda3\lib\site-packages (from spac
y) (1.1.3)
Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in c:\users\admin\anaconda3\lib\site-packages (fro
m spacy) (1.0.5)
Requirement already satisfied: catalogue<1.1.0,>=0.0.7 in c:\users\admin\anaconda3\lib\site-packages (from
spacy) (1.0.0)
Requirement already satisfied: tqdm<5.0.0,>=4.38.0 in c:\users\admin\anaconda3\lib\site-packages (from spac
y) (4.50.2)
Requirement already satisfied: preshed<3.1.0,>=3.0.2 in c:\users\admin\anaconda3\lib\site-packages (from sp
acy) (3.0.5)
Requirement already satisfied: thinc<7.5.0,>=7.4.1 in c:\users\admin\anaconda3\lib\site-packages (from spac
y) (7.4.5)
Requirement already satisfied: setuptools in c:\users\admin\anaconda3\lib\site-packages (from spacy) (50.3.
1.post20201107)
Requirement already satisfied: wasabi<1.1.0,>=0.4.0 in c:\users\admin\anaconda3\lib\site-packages (from spa
cy) (0.8.1)
Requirement already satisfied: requests<3.0.0,>=2.13.0 in c:\users\admin\anaconda3\lib\site-packages (from
spacy) (2.24.0)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in c:\users\admin\anaconda3\lib\site
-packages (from requests<3.0.0,>=2.13.0->spacy) (1.25.11)
Requirement already satisfied: chardet<4,>=3.0.2 in c:\users\admin\anaconda3\lib\site-packages (from reques
ts<3.0.0,>=2.13.0->spacy) (3.0.4)
Requirement already satisfied: idna<3,>=2.5 in c:\users\admin\anaconda3\lib\site-packages (from requests<3.
0.0,>=2.13.0->spacy) (2.10)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\admin\anaconda3\lib\site-packages (from reque
sts<3.0.0,>=2.13.0->spacy) (2020.6.20)
```

In [3]:
```
!pip install WordCloud
```

```
Collecting WordCloud
  Downloading wordcloud-1.8.1-cp38-cp38-win_amd64.whl (155 kB)
Requirement already satisfied: matplotlib in c:\users\admin\anaconda3\lib\site-packages (from WordCloud)
(3.3.2)
Requirement already satisfied: numpy>=1.6.1 in c:\users\admin\anaconda3\lib\site-packages (from WordCloud)
(1.19.2)
Requirement already satisfied: pillow in c:\users\admin\anaconda3\lib\site-packages (from WordCloud) (8.0.
1)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\admin\anaconda3\lib\site-packages (from matplo
tlib->WordCloud) (1.3.0)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.3 in c:\users\admin\anaconda3\lib\sit
e-packages (from matplotlib->WordCloud) (2.4.7)
Requirement already satisfied: certifi>=2020.06.20 in c:\users\admin\anaconda3\lib\site-packages (from matp
lotlib->WordCloud) (2020.6.20)
Requirement already satisfied: cycler>=0.10 in c:\users\admin\anaconda3\lib\site-packages (from matplotlib-
>WordCloud) (0.10.0)
Requirement already satisfied: python-dateutil>=2.1 in c:\users\admin\anaconda3\lib\site-packages (from mat
plotlib->WordCloud) (2.8.1)
Requirement already satisfied: six in c:\users\admin\anaconda3\lib\site-packages (from cycler>=0.10->matplo
tlib->WordCloud) (1.15.0)
Installing collected packages: WordCloud
Successfully installed WordCloud-1.8.1
```

In [115]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
get_ipython().run_line_magic('matplotlib', 'inline')
import re
import time
from datetime import datetime
import matplotlib.dates as mdates
import matplotlib.ticker as ticker
from urllib.request import urlopen
from bs4 import BeautifulSoup as bs
import requests
import string

from matplotlib.pyplot import imread
from wordcloud import WordCloud

import spacy
import nltk

import re
from textblob import TextBlob

%matplotlib inline
```

In [ ]:
```
wm_title=[]
wm_date = []
wm_content = []
wm_rating = []

review_title = []
review_rating = []
review_content = []
review_dates = []


for i in range(1,150):
    link ="https://www.amazon.in/OnePlus-Nord-Charcoal-128GB-Storage/product-reviews/B09576CYNP/ref=cm_cr_ge
    response = requests.get(link)
    print(i)
    soup = bs(response.content,"html.parser")
    title = soup.find_all('a',class_='review-title-content')
   # title = soup.find_all('a',class_='review-title-content')

    for i in range(0,len(title)):
        review_title.append(title[i].get_text())
        review_title[:] = [titles.lstrip('\n') for titles in review_title]
        review_title[:] = [titles.rstrip('\n') for titles in review_title]
        wm_title = wm_title + review_title

    rating = soup.find_all('i',class_='review-rating')

    for i in range(2,len(rating)):
        review_rating.append(rating[i].get_text())
        review_rating[:] = [reviews.rstrip(' out of 5 stars') for reviews in review_rating]
        wm_rating = wm_rating + review_rating

    review = soup.find_all("span",{"data-hook":"review-body"})

    for i in range(0,len(review)):
        review_content.append(review[i].get_text())
        review_content[:] = [reviews.lstrip('\n') for reviews in review_content]
        review_content[:] = [reviews.rstrip('\n') for reviews in review_content]
        wm_content = wm_content + review_content

    dates = soup.find_all('span',class_='review-date')

    for i in range(2,len(rating)):
        review_dates.append(dates[i].get_text())
        review_dates[:] = [reviews.lstrip('Reviewed in India on') for reviews in review_dates]
        wm_date  = wm_date + review_dates
```

In [119]:
```
dataframe_contents = list(zip(wm_title, wm_rating, wm_content, wm_date))
```

In [120]:
```
dataframe = pd.DataFrame(dataframe_contents, columns=["Title", "Rating", "Content", "Date"])
```

In [121]:
```
dataframe.dtypes
```

Out[121]:
```
Title      object
Rating     object
Content    object
Date       object
dtype: object
```

In [122]:
```
dataframe['Date'] = pd.to_datetime(dataframe['Date'])
dataframe['Rating'] = dataframe['Rating'].astype(float)
```

In [123]:
```
dataframe.shape
```

Out[123]:
```
(551775, 4)
```

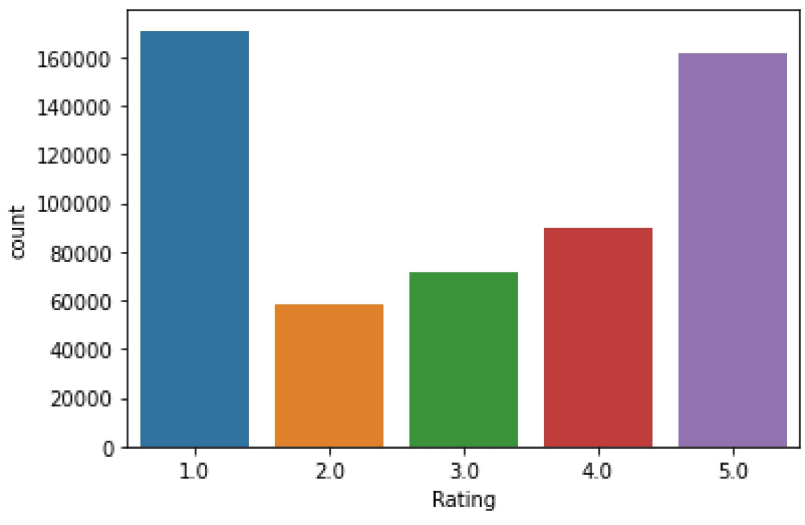
In [125]:
```
dataframe.tail()
```

Out[125]:

	Title	Rating	Content	Date
551770	Can go	5.0	Iam not using this phone for games or for vi...	2021-06-28
551771	OnePlus Nord	5.0	OnePlus Nord CE is an affordable OnePlus Pho...	2021-06-27
551772	Waste.	1.0	Waste. They are just changing the brand nam...	2021-07-18
551773	Butter smooth..outstanding display !!	5.0	Go for it, I am loving it.Great mobile recep...	2021-06-25
551774	Not fully satisfied with this phone.	3.0	Good performance.Good rear camera but front ...	2021-06-21

In [126]:
```
sns.countplot(x = 'Rating', data = dataframe)
```

Out[126]:
```
<AxesSubplot:xlabel='Rating', ylabel='count'>
```



In [127]:
```
def clean_content(Content):
    content = re.sub('@[A-Za-z0-9]+', '', Content) #Removing tag(@)
    content = re.sub('#', '', Content) # Removing hashtag(#)
    content = re.sub('RT[\s]+', '', Content) # Removing RT
    content = re.sub('https?:\/\/\S+', '', Content) # Removing links
    return content

dataframe["Text"] = dataframe.Content.apply(clean_content)
dataframe.head()
```

Out[127]:

	Title	Rating	Content	Date	Text
0	Bakwas phone	1.0	Bakwas phone	2021-06-20	Bakwas phone
1	Bakwas phone	1.0	Bakwas phone	2021-06-20	Bakwas phone
2	After replacement..now better	3.0	Few issues are resolved that are mention bel...	2021-06-20	Few issues are resolved that are mention bel...
3	Bakwas phone	1.0	Bakwas phone	2021-06-20	Bakwas phone
4	After replacement..now better	3.0	Few issues are resolved that are mention bel...	2021-06-20	Few issues are resolved that are mention bel...

Calculating Subjectivity and polarity

Subjectivity is nothing but a sentence that expresses some personal feelings, views, or beliefs. Its values range from 0 to 1 where 0 is very objective and 1 is very subjective,

while polarity simply means emotions expressed in a sentence. Its value ranges from -1 to 1, where -1 represents the most negative comment and 1 represent the most positive comment

In [128]:
```
# let's calculate subjectivity and Polarity
# function for subjectivity
def calc_subj(text):
    return TextBlob(text).sentiment.subjectivity

# function for Polarity
def calc_pola(text):
    return TextBlob(text).sentiment.polarity

dataframe['Subjectivity'] = dataframe.Text.apply(calc_subj)
dataframe['Polarity'] = dataframe.Text.apply(calc_pola)
dataframe.head()
```

Out[128]:

	Title	Rating	Content	Date	Text	Subjectivity	Polarity
0	Bakwas phone	1.0	Bakwas phone	2021-06-20	Bakwas phone	0.000	0.000000
1	Bakwas phone	1.0	Bakwas phone	2021-06-20	Bakwas phone	0.000	0.000000
2	After replacement..now better	3.0	Few issues are resolved that are mention bel...	2021-06-20	Few issues are resolved that are mention bel...	0.625	0.044444
3	Bakwas phone	1.0	Bakwas phone	2021-06-20	Bakwas phone	0.000	0.000000
4	After replacement..now better	3.0	Few issues are resolved that are mention bel...	2021-06-20	Few issues are resolved that are mention bel...	0.625	0.044444

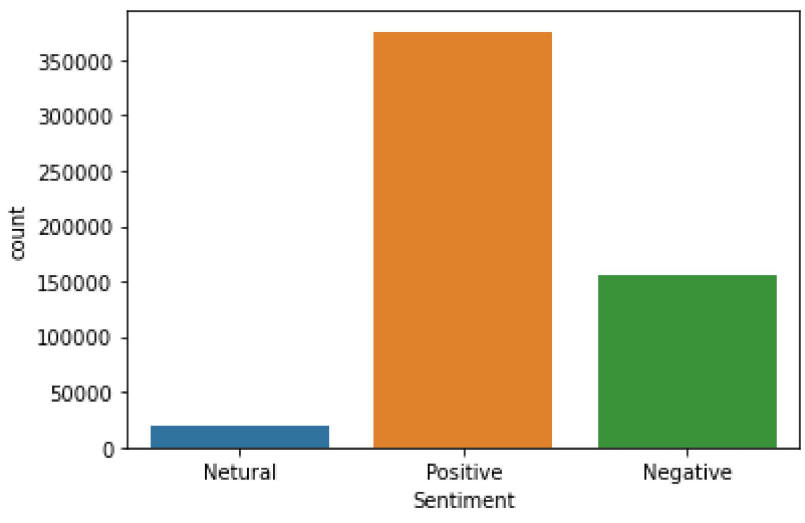
In [130]:
```
# now let's classify these tweets based on their sentiment(polarity)
def sentiment(polarity):
    result = ''
    if polarity > 0:
        result = 'Positive'
    elif polarity == 0:
        result = 'Netural'
    else:
        result = 'Negative'
    return result

dataframe['Sentiment'] = dataframe.Polarity.apply(sentiment)
dataframe.tail()
```

Out[130]:

	Title	Rating	Content	Date	Text	Subjectivity	Polarity	Sentiment
551770	Can go	5.0	Iam not using this phone for games or for vi...	2021-06-28	Iam not using this phone for games or for vi...	0.750000	0.550000	Positive
551771	OnePlus Nord	5.0	OnePlus Nord CE is an affordable OnePlus Pho...	2021-06-27	OnePlus Nord CE is an affordable OnePlus Pho...	0.686111	0.438889	Positive
551772	Waste.	1.0	Waste. They are just changing the brand nam...	2021-07-18	Waste. They are just changing the brand nam...	0.000000	-0.200000	Negative
551773	Butter smooth..outstanding display !!	5.0	Go for it, I am loving it.Great mobile recep...	2021-06-25	Go for it, I am loving it.Great mobile recep...	0.544444	0.330035	Positive
551774	Not fully satisfied with this phone.	3.0	Good performance.Good rear camera but front ...	2021-06-21	Good performance.Good rear camera but front ...	0.566667	0.143750	Positive

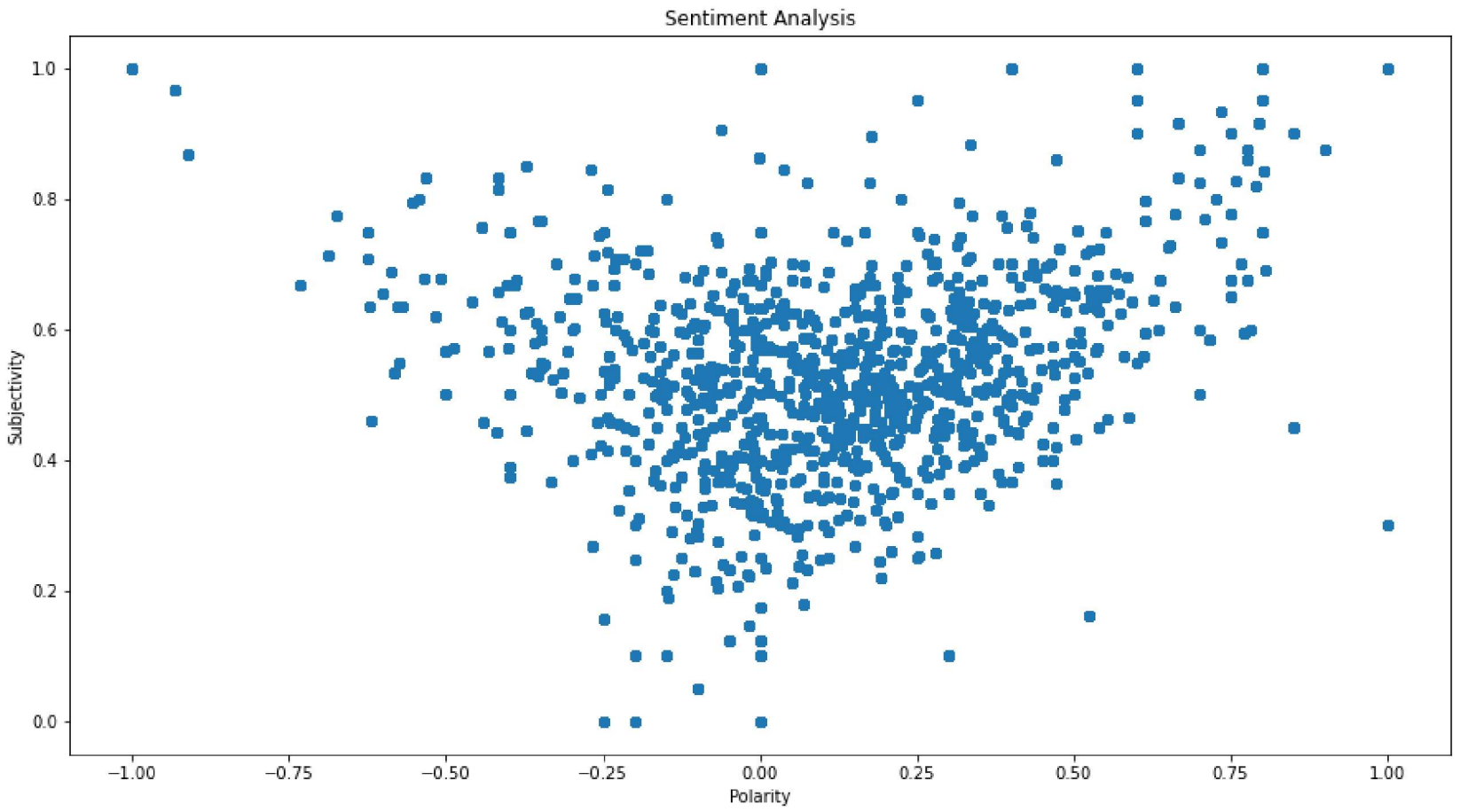
In [131]:
```
sns.countplot(x = 'Sentiment', data = dataframe)
```

Out[131]: <AxesSubplot:xlabel='Sentiment', ylabel='count'>



In [132]:
```
f, axes = plt.subplots(figsize = (15,8))
plt.scatter(dataframe.Polarity, dataframe.Subjectivity)
plt.title('Sentiment Analysis')
plt.xlabel('Polarity')
plt.ylabel('Subjectivity')
```

Out[132]: Text(0, 0.5, 'Subjectivity')



In [133]:
```
import plotly.express as px
import plotly.graph_objects as go
from plotly.subplots import make_subplots
import warnings
warnings.filterwarnings("ignore")


type_ = ["Positive", "Neutral", "Negative"]
fig = make_subplots(rows=1, cols=1)

fig.add_trace(go.Pie(labels=type_, values=dataframe['Sentiment'].value_counts(), name="Sentiment"))

# Use `hole` to create a donut-like pie chart
fig.update_traces(hole=.4, hoverinfo="label+percent+name", textfont_size=16)

fig.update_layout(
    title_text="Sentiment Analysis",
    # Add annotations in the center of the donut pies.
    annotations=[dict(text='Sentiment', x=0.5, y=0.5, font_size=20, showarrow=False)])
fig.show()
```

In [134]:
```
# setting up stop words
nltk.download('stopwords')
stpwrd = set(nltk.corpus.stopwords.words('english'))

# Combining all tweets text
allWords = ' '.join([twts for twts in dataframe['Text']])
#allWords
```

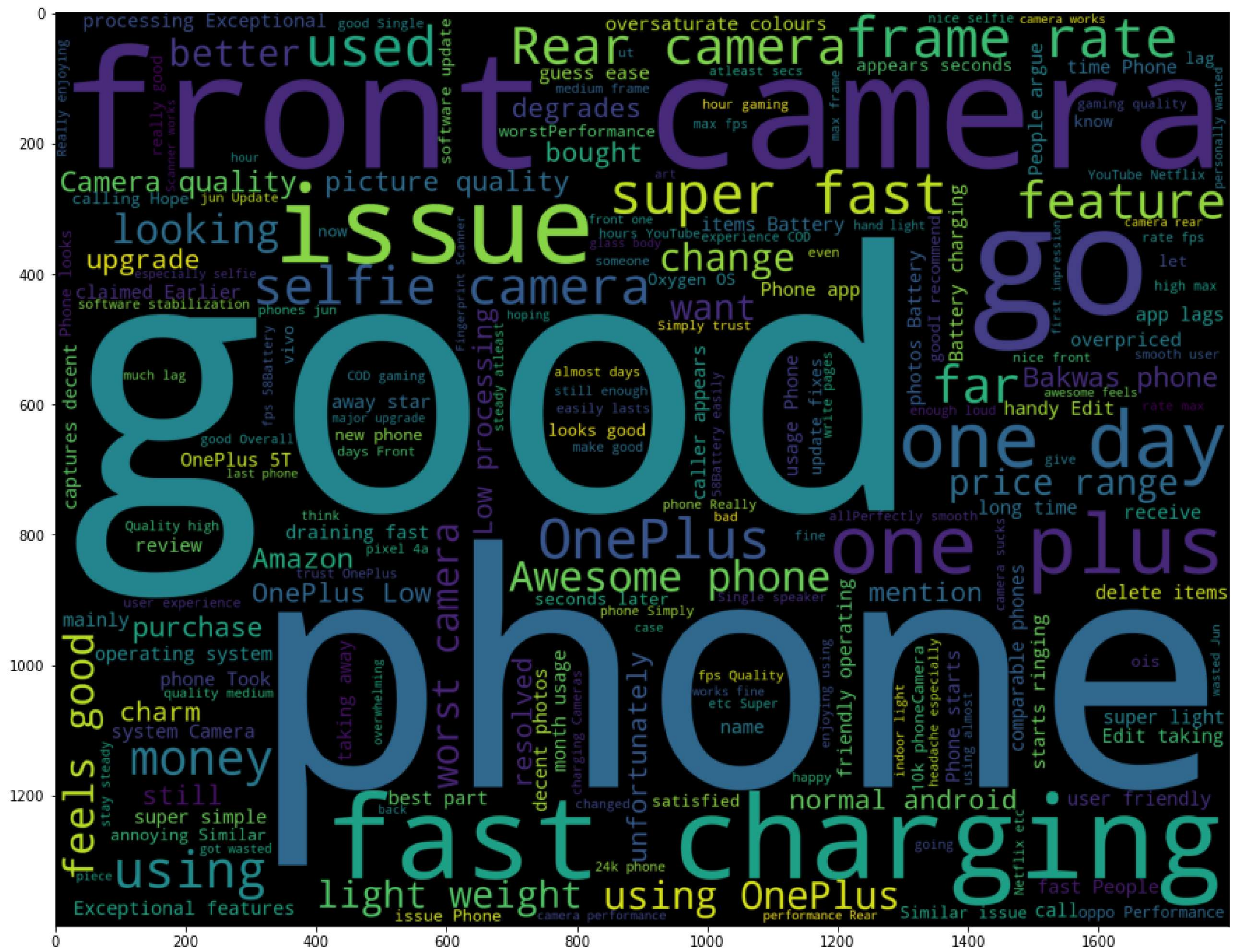
```
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\Admin\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

In [139]:
```
# setting up stop words
nltk.download('stopwords')  # run this if you get any error
stpwrd = set(nltk.corpus.stopwords.words('english'))

# Combining all tweets text
allWords_ = ' '.join([twts for twts in dataframe[:500]['Text']])
```

```
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\Admin\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

In [140]:
```
f, axes = plt.subplots(figsize=(20,12))
wordcloud= WordCloud(
        background_color = 'black',
        width = 1800,
        height =1400).generate(allWords_)
plt.imshow(wordcloud)
```

Out[140]: <matplotlib.image.AxesImage at 0x2660cc10760>



In [146]:
```
with open("positive-words.txt","r") as pos:
    poswords = pos.read().split("\n")

with open("negative-words.txt","r") as neg:
    negwords = neg.read().split("\n")


pos_words = poswords[35:]
neg_words = negwords[35:]


sentences = dataframe[0:500]["Text"].to_list()

from nltk.stem import WordNetLemmatizer
from nltk.corpus import stopwords
wordnet = WordNetLemmatizer()
import re

filtered_sent=[]
for i in range(len(sentences)):
    review = re.sub("[^A-Za-z" "]+"," ",sentences[i])
    review = re.sub("[0-9" "]+"," ",sentences[i])

    review = review.lower()
    review =review.split()
    review = [wordnet.lemmatize(word) for word in review if not word in set(stopwords.words('english'))]
    review = ' '.join(review)
    filtered_sent.append(review)

filtered_sent[0:5]
```

Out[146]:
```
['bakwas phone',
 'bakwas phone',
 'issue resolved mention below..but still mobile charm oneplus..it like normal android..not oneplus..low pr
ocessing, exceptional feature oneplus phone..took long time delete items..battery draining fast..charging f
ast claimed..earlier using oneplus t..i bought upgrade unfortunately degrades...',
 'bakwas phone',
 'issue resolved mention below..but still mobile charm oneplus..it like normal android..not oneplus..low pr
ocessing, exceptional feature oneplus phone..took long time delete items..battery draining fast..charging f
ast claimed..earlier using oneplus t..i bought upgrade unfortunately degrades...']
```

In [147]:
```
from sklearn.feature_extraction.text import TfidfVectorizer
tf = TfidfVectorizer()
text_tf = tf.fit_transform(filtered_sent)
feature_names = tf.get_feature_names()
dense = text_tf.todense()
denselist = dense.tolist()
sentences_df =pd.DataFrame(denselist, columns=feature_names)
sentences_df.head()

f, axes = plt.subplots(figsize=(20,12))
pos_words = ' '.join([w for w in sentences_df if w in poswords])

cloud_pos = WordCloud(
        background_color = 'black',
        width =1800,
        height=1400).generate(pos_words)
plt.imshow(cloud_pos)
```

Out[147]: <matplotlib.image.AxesImage at 0x2660d97fcd0>

In [144]:
```
f, axes = plt.subplots(figsize=(20,12))
neg_words = ' '.join([w for w in sentences_df if w in negwords])

cloud_neg = WordCloud(
        background_color='black',
        width =1800,
        height =1400).generate(neg_words)
plt.imshow(cloud_neg)
```

Out[144]: <matplotlib.figure.AxesImage at 0x2677e48a370>